Space Weather Technical Forecast

Issued on Saturday, 04 December 2021 at 00:49 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of G1/Minor Storm activity mainly day 1 (4th)

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was very low, with only low B-flares observed. There are currently two sunspot regions on the visible disc. AR2902 in the northwest has continued to gradually decline losing its trailing spots and is now classified as an Hsx/alpha. There is a very weak newly emerged region in the southeast, unnumbered Axx/alpha. AR2898 has rotated off the visible disk, a new region to the southeast of it has faded to plage. No Earth-directed CMEs have been observed in coronagraph imagery, a filament was observed leaving the Sun in SDO aia-304 imagery around 23/0800-0930 UTC, however, analysis suggests it will miss Earth.
Solar Wind / Geomagnetic Activity: The solar wind speed, as measured by DSCOVR at L1, was slightly elevated through the period, ending around 480 km/s. Density was around average, or just above, rising to peak 15 ppcc around 03/1400 UTC before falling again. The strength of the Interplanetary Magnetic Field (IMF), Bt was generally weak, but did reach 9 nT at 03/1440 UTC. The north-south component of the field, Bz, has ranged between -8 and +7nT, more generally being within the -5 to +4 nT. The Phi angle was predominantly in a positive orientation (away from the Sun). Resultant geomagnetic activity was Quiet to Unsettled levels (Kp 1-3).
Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) remained at background levels. The high energy electron flux (greater than 2 MeV) was mainly High (greater than 1000 pfu) with peak at 4870 pfu at 03/1520 UTC, though it rapidly dropped below 1000 pfu at 03/1625 UTC. The associated 24-hour integrated fluence remained above the Active threshold (1e8 integrated pfu), reaching a peak of 1.44e8 integrated pfu at 03/1800 UTC, since this time it has been declining. Observed fluence at 04/0001 UTC was 1.13e8 integrated pfu.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to remain predominantly very low, with a slight chance of C-class flares.
Solar Wind / Geomagnetic Activity: No Earth-directed CMEs have been observed. Fast winds from coronal hole 27 are expected to arrive early on day 1 (4th), with solar winds likely becoming elevated. Ongoing fast wind influence is then expected into day 2 (5th), with coronal hole 28, before easing later in the period. Geomagnetic activity is likely to increase to Unsettled to Active with a chance of isolated G1/Minor storm intervals on day 1 (4th). Quiet to unsettled activity expected to return by day 3 (6th).
Energetic Particles / Solar Radiation: The high energy (greater than 10 MeV) proton flux is expected to remain at background levels. The high energy electron flux (greater than 2 MeV) is expected to return to predominantly High levels. The associated 24 hour integrated fluence is likely to return to above the Active threshold (1e8 integrated pfu) and remain there, although confidence falls a little day 3 (6th) onward.

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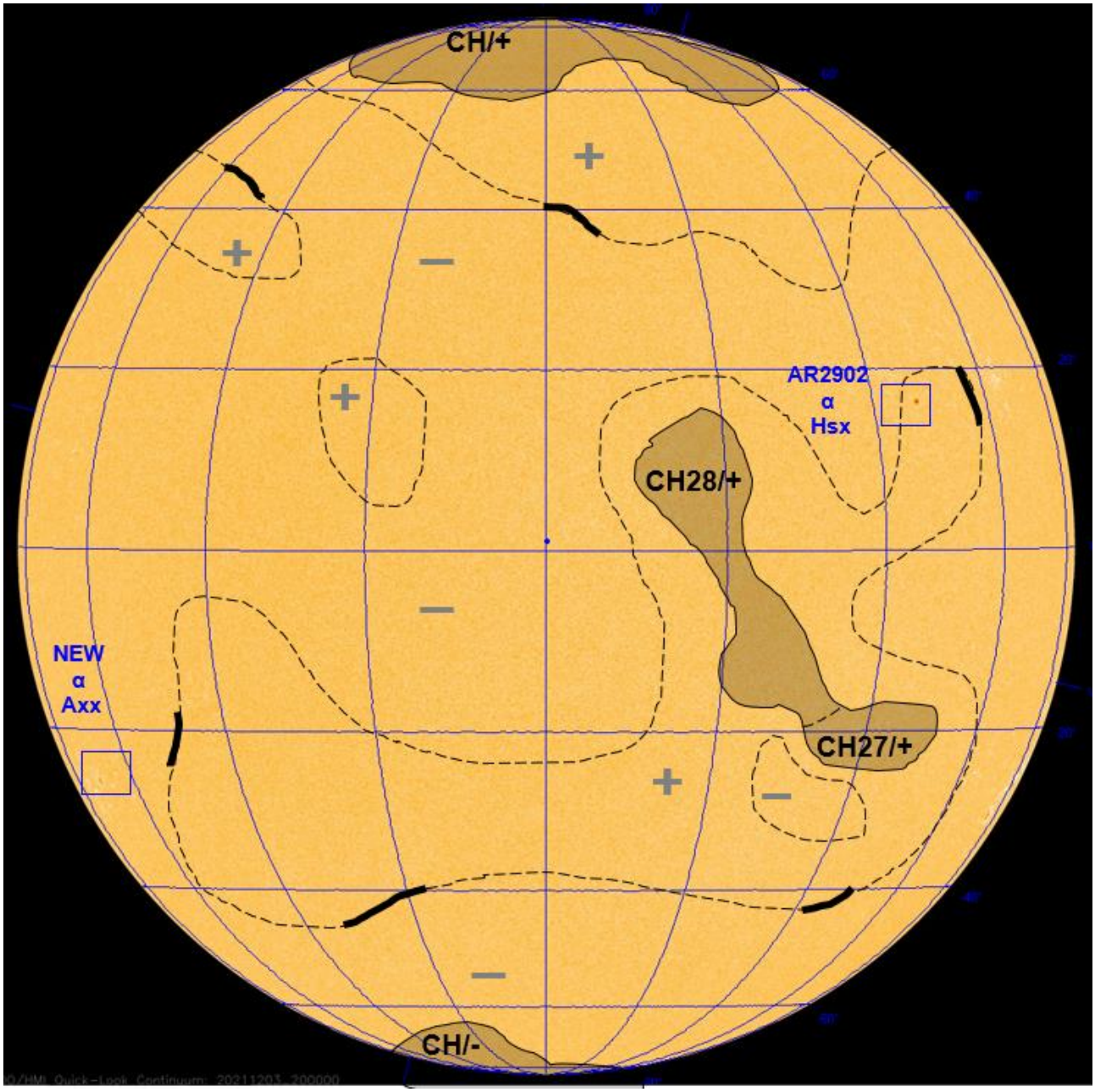
Figure 1. Solar Analysis Valid 03/2000UTC.



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Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Met Office Space Weather Technical Forecast

Geomagnetic Storms:

There are currently no Earth-directed CMEs.
The main enhancement expected over the next 12 hours is the arrival of the fast wind of CH27, and the subsequent transition into the fast wind of CH28. These two coronal holes extend from the southeast quadrant, northeastwards across the equator to the central northern disc. Whilst any enhancement indicated in Enlil is muted, and STEREO A data is too patchy to draw conclusions, a similar positioned hole on the previous rotation led to speeds of around 600 km/s being observed. This fast wind is expected to gradually decline day 2 (5th) onward.
Geomagnetic activity is currently Unsettled to Active with a chance of isolated G1/Storm intervals on day 1 (4th) and a slight chance on day 2 (5th), due to the onset of the fast winds of CH27 and CH28. Quiet to unsettled activity expected to return by day 3 (6th).

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	20	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections- Nil

Radio Blackouts - X-Ray Flares:

Solar Activity is currently Very Low, with only small B-class flares observed in the last 24 hours. There are currently two active regions on the visible disc, however they are both small, inactive and currently not expected to be the source of notable flare activity, with only a slight chance (10%) of isolated C-class flares.
AR2898 Hsx/Alpha has rotated around the southwest limb and off the Earth-facing disc. The new region that emerged in an area of plage to the southeast of AR2898 has decayed.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	1	1	1	1
Very Active	R3 to R5 X Class	No	1	1	1	1

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Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) as observed by GOES-16 is forecast to remain at background levels, with no solar radiation storms anticipated.

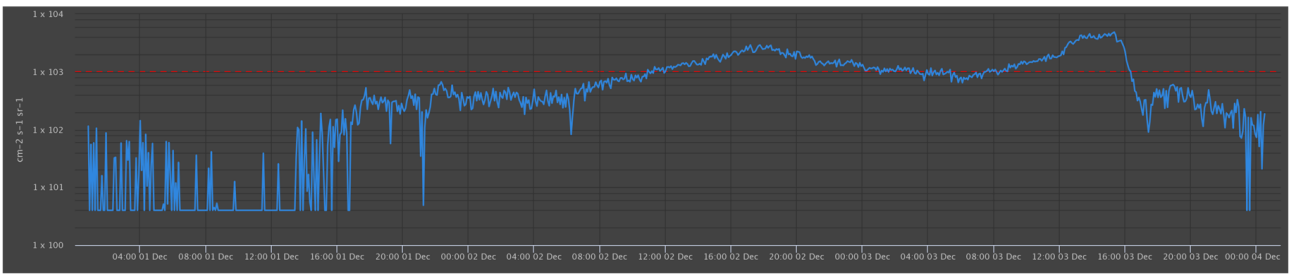
Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	1	1	1	1
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

High Energy Electrons Event (≥ 2MeV):

The high energy electron flux (greater than 2 MeV) as observed by GOES-16 is currently Moderate having been High for long periods during the UTC day on Friday. Whilst some drop out in values is anticipated with the arrival of the fast wind of CH27/CH28 early on day 1 (4th), values will likely recover by day 2 (5th) to give a further period of mainly High values.
The associated 24 hour electron fluence is currently Active (greater than 1e8 integrated pfu), and despite flux levels having dropped out, fluence is expected to return above the Active level during day 1 (4th). Confidence for Active fluence is then lower day 2 onward, however this remains likely, due to flux levels being forecast to recover to be mainly high from day 2 (5th) onward. REFM is suggesting a downward trend from day 2 (5th) but reducing values too quickly beyond this period.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	Yes	80	70	60	60
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	1	1	5	5

Figure 2: 3 days ElectronFlux shows each day's maximum value higher than the previous day.



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